

A NEW SKINK, *NANGURA SPINOSA* GEN. ET SP. NOV., FROM A DRY RAINFOREST
OF SOUTHEASTERN QUEENSLAND

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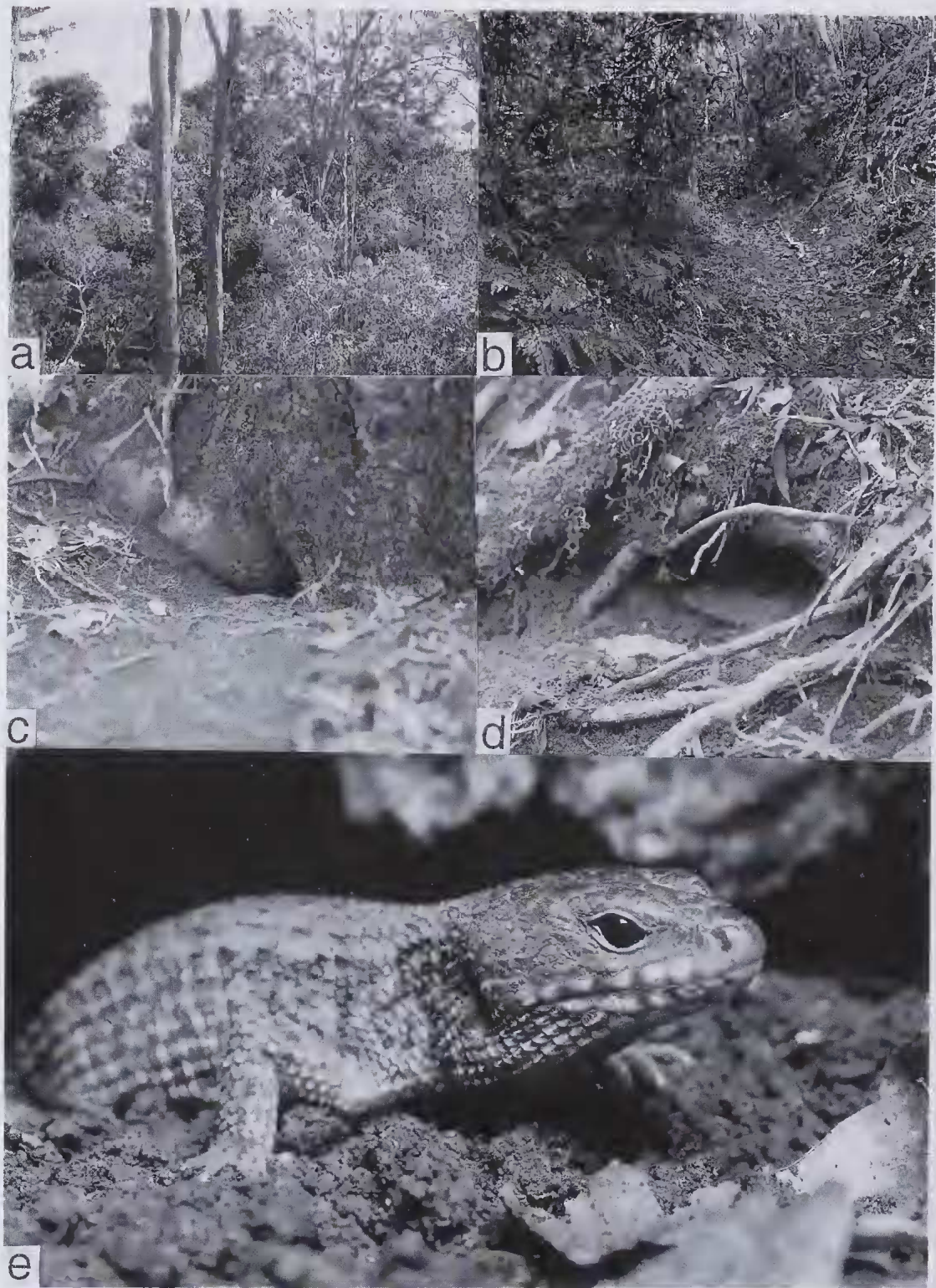
Nangura spinosa gen. et sp. nov. is a very distinct member of the *Sphenomorphus* group. It resembles *Gnypetoscincus queenslandiae* superficially in being very spiny. It is, however, larger than *G. queenslandiae*, has supratemporal fossae (absent in *G. queenslandiae*), and a karyotype $2n=28$ (vs 30). It also has an interparietal which totally separates the parietals. *Nangura spinosa* is the first reptile species known to be confined to the remnant dry rainforests (= semievergreen vine thickets) of southeastern Queensland. It is known only from Nangur State Forest (Figs 1a,b), which is now, like most semievergreen vine thickets in southeastern Queensland, in the care of the Queensland Forest Service. □ *Nangura spinosa*, *Sphenomorphus* group, dry rainforest, Scinidae, southeastern Queensland.

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The reptiles of the tropical and subtropical moist rainforests (=micro, meso and notophyll vine forests) of Queensland are now relatively well known as far as species and broad distributions are concerned (Covacevich & McDonald, 1991). These species have been the subject of intense taxonomic research in the last decade or so. No less than 11 species have been described from Queensland's moist rainforests since 1980. Many of these species are endemic to Australia and have extremely narrow ranges. By contrast, the reptiles of the dry rainforests (=semievergreen vine thickets, *inter alia*, Webb, 1978) are not well known. Semievergreen vine thickets occur in a broken band to the west of the better-known moist rainforests of the near coastal uplands and plains. Some reptile surveys were undertaken in semievergreen vine thickets in the mid 1970s (Anonymous, 1976; Queensland Museum, 1977). They form an important habitat for some recently described species from north and mid-eastern Queensland (e.g. *Anomalopus brevicollis* Greer & Cogger 1985; *Glaphyromorphus cracens* (Greer 1985); and *Lerista vittata* Greer et al., 1985), but endemism is not a feature of their reptile (and other vertebrate) fauna. The reptiles from semievergreen vine thickets surveyed to date are either wide-ranging species recorded from moist rainforests to sparse, open woodlands (e.g. *Varanus varius*, *Rhinoplocephalus nigrescens*, *Boiga irregularis*), or from purely open

forests (e.g. *Carlia mundivensis*, *Carlia schmeltzii*, *Heteronotia binoei*, *Lialis burtonis*).

In southern Queensland, '.... vineforests ... include a number of vegetation communities that are known by a variety of names, including rainforest scrub, hoop-pine scrub, vine scrub, vine thicket and softwood scrub. These communities have been largely cleared in southern Queensland because of their rich soils and value for agriculture. The remaining stands are remnants ... 'of less than 1 hectare to large stands of up to 3000 ha, however most are small and less than 100 ha in size' (Forster et al., 1991). Nangur State Forest (Fig. 1a-b) is a patch of semievergreen vine thicket near Murgon, SEQ, only 250km northwest of Brisbane. Survey work on the vertebrates of this and other similar forests was undertaken in 1992. The results of those surveys are reported in this volume (Covacevich et al., 1993; Horsup et al., 1993). In June, 1992, one of us (C.J.), working with Mr Mark Fletcher, excavated a burrow 'which looked as if it might have been made by a lizard'. A very distinct, spiny skink, here described as *Nangura spinosa* gen. et sp. nov., was found in a small chamber about 60cm from the burrow entrance. *N. spinosa* is only the second reptile species known to be confined to semievergreen vine thicket. (The other is *Lerista vittata*). It is a large, distinctive skink. That it remained unknown till 1992 and has been discovered close to Brisbane, where the reptiles are generally well-known, is remarkable.



N.spinosa 'fits' closely, but not perfectly, into the definition of Greer (1979) for members of the *Sphenomorphus* group. It has 8 premaxillary teeth; an open Meckel's groove; each parietal bordered posterolaterally by the temporals; enlarged medial preanals; two rows of scales on the basal half of the dorsal part of the fourth digit; an iris and pupil which are equally dark; a thin bilobed hemipenis. It lacks pterygoid teeth and a postorbital bone. (The latter is present in some members of the *Sphenomorphus* group, e.g. *Eulamprus* spp. and absent in others, e.g. *Ctenotus* spp. Its presence is regarded as primitive for the group, Greer, 1979; Hutchinson, pers. comm. In *N.spinosa* the former postorbital has been incorporated in the postfrontal. A short, incomplete suture is the only remaining trace of this bone.) *N.spinosa* is secretive, has a scaly eyelid and fully-developed pentadactyl limbs, and appears not to be sexually dimorphic/dichromatic (our sample size is of five specimens only). The latter suite of characters used also by Greer (1989) for the *Sphenomorphus* group are primitive characters for all skinks, and are generally true for the *Sphenomorphus* group (M. Hutchinson, pers. comm.). *N.spinosa* has greatly enlarged preanal scales, an iris virtually as dark as its pupil, and a bifurcate hemipenis - a combination present only in members of the *Sphenomorphus* group (Hutchinson, pers. comm.).

In two characters *N.spinosa* is unusual amongst members of the *Sphenomorphus* group. *Nangura* is the only member of the *Sphenomorphus* group karyotyped to date that has $2n=28$. (Genera karyotyped include *Anomalopus*, *Calyptotis*, *Ctenotus*, *Eremiascincus*, *Glaphyromorphus*, *Gnypetoscincus*, *Hemiergis*, *Lerista*, *Lipinia*, *Lobulia*, *Notoscincus*, *Papuascincus*, *Prasinohaema*, *Saiphos* and *Sphenomorphus*). All, except *Lipinia* (which has $2n=42$), have $2n=30$ (which is seen also in *Scincella laterale* of the USA). Karyotype thus strongly emphasises the uniqueness of *N.spinosa* in comparison with *Gnypetoscincus queenslandiae* and *Eulamprus* spp. with which it shares some characters (Donnellan, 1985; Donnellan, pers. comm.). Further, its parietal scales are totally separated by the interparietal. This character is present in only one species group (*Eulamprus quoyii*) of the *Sphenomorphus* group. It seems more reasonable

to expand definitions of Greer (1979, 1989) slightly to include *N.spinosa* in the *Sphenomorphus* group, than to separate it from the group because of these distinctive features.

The most striking feature of *N.spinosa* is the presence of well-defined spines all over its dorsum. In this feature and in general body proportions, it bears some resemblance to *G. queenslandiae* (of the *Sphenomorphus* group) and to some of the *Egernia* species (of the *Mabuya* group). In the *Sphenomorphus* group, Greer (1989) recognises two subdivisions based on ecology, surface-dwelling species (e.g. *Ctenotus* spp.) and semi-fossorial or fossorial species (e.g. *Coeranoscincus* spp.). He notes the unique case of *G. queenslandiae* which, despite its surface-dwelling habits, is a sedentary lizard that spends much of its life under rotting rainforest logs. He places it with semi-fossorial or fossorial species.

The following characters are used: snout to vent length (SVL); tail length (T); length of front leg (L1); length of hind leg (L2); head length (HL); head width (HW). Character definitions and measurements follow Couper et al., 1993.

Nangura gen. nov.

Head scales rugose. Most other dorsal and lateral scales keeled, and not, or only just overlapping. Keels on the tail are most pronounced, almost pyramidal. Dorsal keels form longitudinal lines. Axillal and inguinal scales bead-like to granular. Ventral scales weakly carinate. Iris very dark, almost as dark as the pupil which is black.

Rostral in broad contact with the frontonasal, which thus separates the nasals widely. Prefrontals large, moderately spaced. Frontal elongate, almost 1.5 times as long as broad. Fronto-parietals in broad contact, and in contact with supraoculars 2, 3 and 4. Interparietal elongate, almost rectangular, about twice as long as broad, and about as long as the parietals. Parietals widely separated by the interparietal and bordered by two temporals. Supraoculars 4. Supraciliaries 5-7. Suboculars in a distinct row, in contact with supralabials and granules of the lower eyelid. Lower eyelid scaly, without a disc. Loreal scales 2, the posterior one the larger. Ear opening large, about three times as long as wide; vertical, lacking lobules, and with a superficial tympanum.

FIG. 1a Nangur State Forest from the track bisecting it, showing low, closed canopy of typical semievergreen vine thicket. b Bed of small unnamed creek in Nangur State Forest. All known specimens of *N.spinosa* have been collected or seen on the banks of this creek. c-d Entrances of burrows of *N.spinosa*. e *N.spinosa* (J57247).

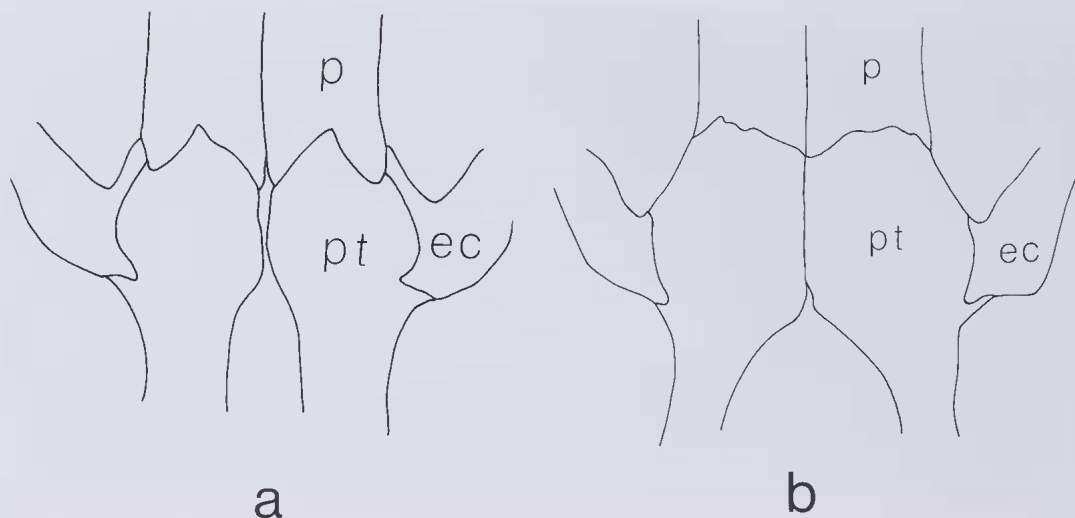


FIG.2 Ectopterygoid, pterygoid and palatine contacts in (a) *N.spinosa* (J57247), (b) *Gnypetoscincus queenslandiae* (J56824).

Medial pairs of preanal scales greatly enlarged. Dorsal scales of the fourth toe paired basally.

Palatine bones in broad medial contact. Palatal rami of the pterygoid bones narrowly separated. Ectopterygoid bones contacting both the palatines and the pterygoids (Fig. 2a). No postorbital. Supratemporal fossae present. Eight conical teeth on the premaxilla. Pterygoid without teeth. Meckel's groove open (Fig. 3).

Karyotype $2n=28$.

Hemipenis smooth, bilobed.

***Nangura spinosa* sp. nov.**
(Figs 1-5)

MATERIAL EXAMINED

HOLOTYPE: QMJ55424 ♀, Nangur State Forest (SF74), 26°07', 151°58' SEQ, C. James & M. Fletcher, 5 June 1992.

PARATYPES: QMJ56029 ♀, J56031, J57246-7, Nangur State Forest, SEQ.

DIAGNOSIS

N.spinosa is distinguished from other members of the *Sphenomorphus* group (except some *Eulamprus* spp., all of which lack keels) by the state of the parietal shields (parietals not in contact behind the interparietal vs parietals in contact behind the interparietal). It is distinguished from *G. queenslandiae*, the species to which it bears most resemblance, by midbody scale count (28-30 vs 32-36, Cogger 1992); and by karyotype $2n$ (28 vs 30); degree of caudal keeling (very pronounced vs not pronounced); degree of lateral

scale overlap (some vs none); supratemporal fossae (present vs absent); contact between ectopterygoid, palatine and pterygoid bones (ectopterygoid contacting both vs contacting only the pterygoid, Fig 2a,b); and size (max SVL 95.10 mm vs 90.80 mm). As *Nangura* and *Gnypetoscincus* are monotypic, the characters which separate them generically also separate them at the species level. (The latter was redefined by Ingram, 1985, following separation of the Australian '*Tropidophorus*' *queenslandiae* from Southeast Asian *Tropidophorus* spp., as *Gnypetoscincus queenslandiae*, Wells and Wellington, 1985).

DISTRIBUTION

Known only from the type series. All specimens were collected in Nangur SF (SF74), approximately 20km north of Murgon, SEQ.

HABITAT

Semievergreen vine thicket on dark, basaltic soils. Forster et al., 1991 describe Nangur State Forest as having 'canopy intact, exotic weeds present'. Estimates of the size of the forest range from < 500 ha (Forster et al., 1991) to 822 ha (P. Flower, pers. comm.).

HOLOTYPE

SVL (mm): 88.9. Proportions as % SVL: T = 85.0, L1 = 30.2, L2 = 38.1, HL = 24.5, HW = 16.9.

Very spinose, dorsal and lateral scales, save those of the head (which are rugose) and of the axillal and inguinal area (which are bead-like to

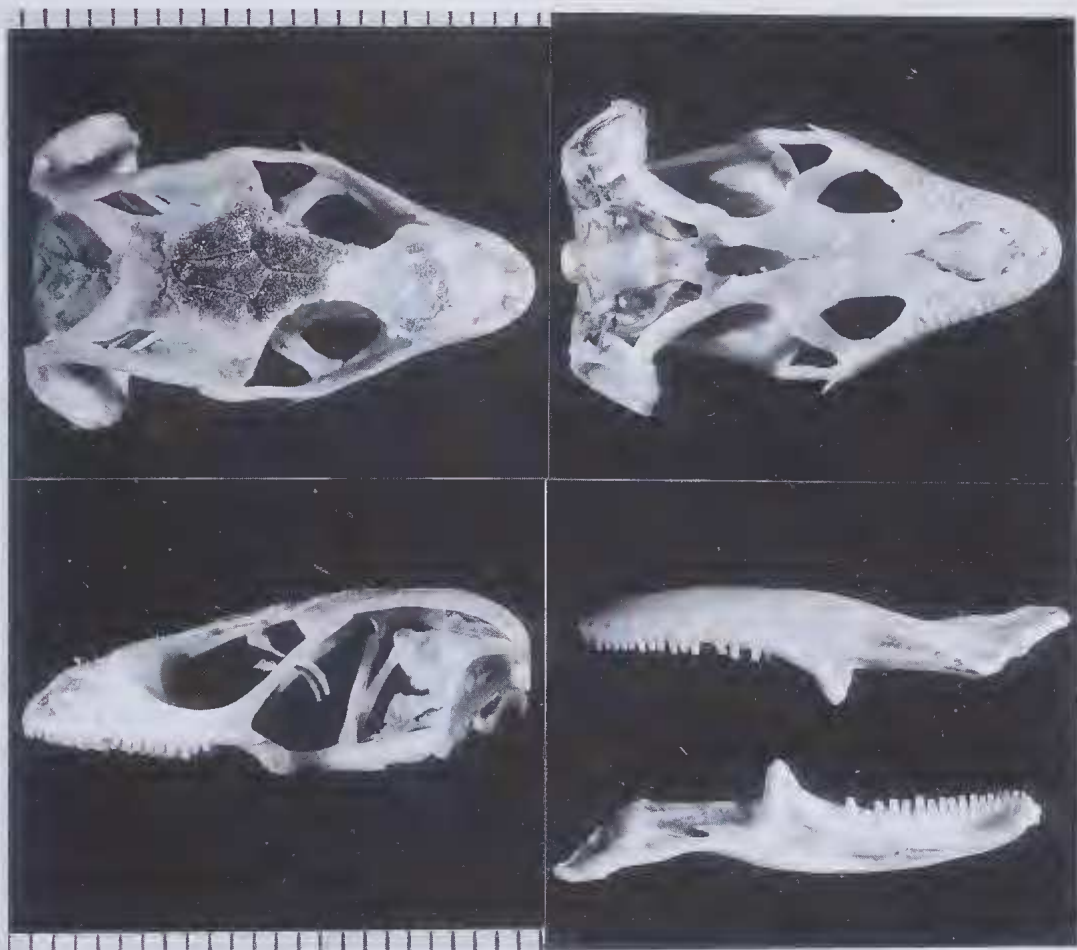


FIG. 3 Skull of *N. spinosa* (J57247).

granular), keeled.(Fig. 5). Keels most pronounced, almost pyramidal, laterally at the base of the tail; strongly developed dorsally and laterally (including the limbs); forming pronounced dorsal longitudinal ridges. Scales of the venter weakly carinate. Midbody scale rows, 30. Paravertebral scales, 40. Preanal scales 4, the middle two greatly enlarged.

Head: moderate, with rugose scalation on dorsal and lateral surfaces; parietals not in contact behind interparietal; interparietal free, elongate; frontoparietals paired, in broad contact; frontonasal single; prefrontals large, moderately spaced; frontal elongate, almost 1.5 times as long as broad; nasals separated by broad rostral/frontonasal contact; supralabials 6; infralabials 4, 2nd largest; supraoculars 4, 2nd largest; supraciliaries 6/7; loreals 2, 2nd largest; presuboculars, 1; subocular scales between the supralabials and scales

of the lower eyelid, 3; temporals, an irregular series of small scales; eye dark, pupil not clearly defined; lower eyelid scaly, lacking palpebral disc; ear opening large, vertical without lobules; tympanum superficial, 1st and 2nd chin shields enlarged, 3rd chin shields divided

Limbs: well developed, markedly overlapping when adpressed; plantar scales rounded, slightly keeled; 4th toe markedly longer than 3rd toe; subdigital lamellae, 16/17, bluntly keeled.

Tail: cylindrical, tapering to a point; subcaudal scales slightly enlarged in relation to those adjoining them; vertebral scales not enlarged.

Colour: dorsal surface brown with irregular black crossbands from nape to base of tail; venter cream; lips pale, heavily barred with black; upper lateral zone predominantly black, broken by cream bars; flanks cream with dark flecks.



FIG. 4 a-b *Nangura spinosa*. (J57246, J57247)

PARATYPES

SVL (mm): 84.2-95.1. Proportions as % SVL:
T 88-94 (n3, mean 89.8); L1 30-33 (n4, mean
31.9), L2 37-42 (n 4, mean 39.7), HL 24-29 (n4,

mean 26.8), HW 17-20 (n4, mean 18.7). Midbody
scale rows, 28 (J57246-7), 29 (J56031), paraver-
tebral scales, 38 (J57247), 41 (J56029).

Head: infralabials 3, right side only, 3rd largest

(J57246); supraciliaries 5, right side only (J56031); subocular scales between the supralabials and scales of the lower eyelid 2, right side only (J56029, J56031); 2, left side only (J57246).

Limbs: subdigital lamellae, 15/15 (J56029), 18/17 (J56031), 16/16 (J57246), 15/13 (J57247); lamellae broadly callose (J56031, J57246).

FIELD NOTES

All known *N. spinosa* specimens have been collected from burrows in dry, hard, black, basaltic soil. J57246 was taken from a burrow 33.5cm long, with a diameter of roughly 2.0cm. Other burrows excavated have ranged to 60cm. The entrances of burrows are concealed generally by association with tree bases or surface roots (Fig. 1c,d). One (the first found and excavated by C.J. and M. Fletcher) was in the open, several metres from any cover. Two of four burrows excavated terminated in an oval chamber with a length of about 5cm.

N. spinosa occurs in small colonies. The type locality has been searched methodically and extensively. All burrows known lie on the gently sloping bank of a seasonal, unnamed small creek, above what we surmise to be the wet season water flow level, but close to it in one case. Two colonies of solitary or near solitary specimens were found 500 metres apart. (All but one burrow housed only one adult *N. spinosa*. The exception was 'home' to two specimens - an adult observed, and a neonate 'fished' from the burrow using a meal worm as bait and a cotton thread as line, 14 April 1993. This specimen was released after being measured, SVL 4.1cm, T 3.4cm. It retained an 'umbilical' scar). Burrows located are roughly 20-30 m apart. In June, 1992, and April, 1993 the ground was dry and very hard. No sign of digging was seen, and each burrow appeared to have a smooth resting platform of about 6x4cm. The platforms appear to be compacted. In November, 1992, C.J. observed that burrows appeared to be 'active'. Small screes of friable soil near burrow entrances suggested digging was either current or very recent. With each burrow there is a defecation site about 30cm from the burrow entrance. As well as faeces, fragments of shed *N. spinosa* skin were found on these sites.

Faeces found in April, 1993, contained hemipteran abdomen, thorax, other remains, coreid (*Pachycolpura*) remains; coleopteran legs, scarab elytra, carabid beetles (*Notonomus* sp., *Craspedophorus* sp.), dung beetle (*Canthonosoma* sp., *Cephalodesminus* sp.) remains, ground wcevil

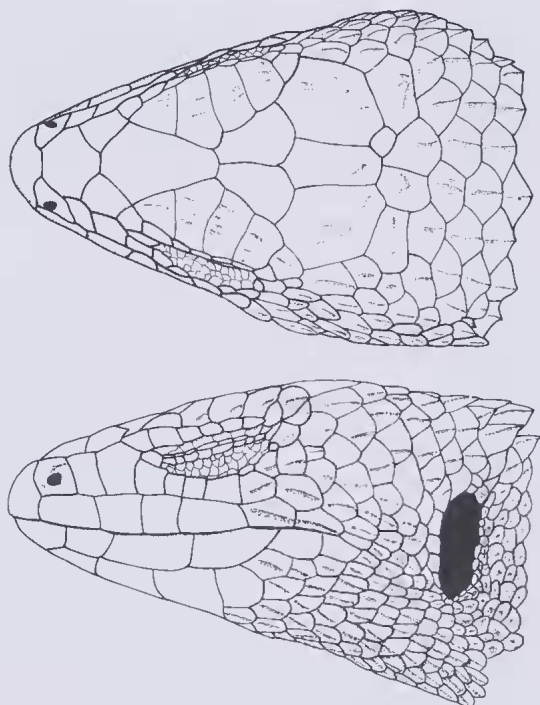


FIG 5. Head scales of the holotype (J55424) of *Nan-gura spinosa*.

remains, click beetle remains, a large cricket head; large ant remains, a wasp head; millipede remains, spider legs. Dr. G.B. Monteith who identified the remains, notes '.... The sample was of a diverse range of well-chewed anthropod remains. No plant material was present. Most common were remains from beetles and spiders, with fewer from bugs, millipedes, ants and a cricket. The largest animal in the sample is the cricket which would have measured 3-4cm. Some of the prey animals have very distasteful defence secretions (e.g. millipedes; carabid beetles; and the coreid bug, *Pachycolpura* sp.). Some of the animals found would be expected to be nocturnal (e.g. *Canthonosoma* sp., *Notonomus* sp. and the cricket). All taxa represented in the sample are forest-floor dwellers....'. All would be wanderers and thus susceptible to ambush by *N. spinosa* (G. Monteith, pers. comm.).

Of the two females, J55424 collected in winter (June, 1992), has slightly enlarged follicles. J56029 collected in spring (September, 1992) also has enlarged follicles. These are larger than those of J55424. Members of the *Sphenomorphus* group are both egg-layers (many *Glaphyromorphus* spp.) and live-bearers (all 8 spp. of *Eulamprus* examined and *G. queenslandiae*),

Greer, 1989. *N.spinosa* is not typical of the *Sphenomorphus* group. It has some features in common with the latter, and the combination of burrow-dwelling habits and a very young specimen in a burrow with an adult suggest that *N.spinosa* is probably a live-bearer.

CONSERVATION

By any standard, a species known from only five type specimens from a single locality, which is a remnant of a forest type previously widely distributed, is in need of special conservation/management attention. Under the system devised by Thomas & McDonald (1989) and applied to all then-known species of reptiles in Queensland by McDonald et al. 1991, *N.spinosa* is a 'species known only from the type collection'(1), and is 'rare in Australia, but not currently considered endangered or vulnerable....'(R).

N.spinosa has already received special attention. Nangur State Forest is protected from further clearing. In addition, following the discovery of *N. spinosa*, the Queensland Forest Service took action to 'minimise disturbance to the animal's habitat...' (T. Ryan, in litt., 23 September, 1993) by restricting access, applying special precautions regarding fire prevention, and advising staff to strive to locate more colonies of *N.spinosa*. Like all other reptiles in Queensland, *N.spinosa* is fully protected under the The Nature Conservation Act of 1992 and The Nature Conservation Regulations, 1993.

Two different approaches can be followed regarding the conservation of *N.spinosa*. A non-interventionist approach is based on the fact that this species has survived much alteration to its habitat. (It is an extremely secrete species, virtually impossible to see accidentally and this undoubtedly accounts for its remaining unrecognised till 1992). Nangur State Forest has been subjected to many assaults, which *N.spinosa* has survived. Much of the original Nangur semievergreen vine thicket was cleared for agriculture, leaving only a core area of about 500ha. This has been bisected by a road, grazed by cattle, and altered on a smaller scale by fires, timber-getting and invasion by *Bufo marinus*, *Sus scrofa*, and many weeds.

The second approach could evolve from recognition of a second important fact about *N.spinosa*. It is, at least as far as present knowledge is concerned, rare and extremely narrowly restricted. Should research effort to extend knowledge of its

ecology with a view to devising an 'active management' scheme be treated as a matter of urgency? Rare, endangered and threatened species research is a very popular field at present (along with research on rainforest taxa). *N.spinosa* qualifies on both fronts for a special place in the current hierarchy of 'worthwhile' research projects. Perhaps it can be considered extra 'worthy', because semievergreen vine thickets are a very poorly known type of rainforest, herpetologically and otherwise. We favour a thorough documentation of the life history, occurrence and habitat requirements of this species, along with continued measures to ensure total protection of its habitat.

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